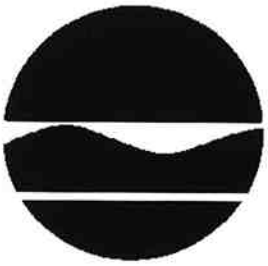
SUPERFUND STANDBY PROGRAM
New York State
Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010

SITE IDs 255 - 258: PICO PRODUCTS, INC. (COMPANY ID 2022) AND SITE ID 255: SYRTEK, INC. (COMPANY ID 2060)

SITE SUMMARY REPORT



Onondaga Lake Project
Task 5: 104(e) Review

Site No. 734030-002
Work Assignment Number D003060-27

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1.0 SITE DESCRIPTION

In general, the information referenced in this report was obtained from the 104(e) responses of two companies: Pico Products, Inc. (Pico, Company ID 2022); and Syrtek, Inc. (Syrtek, Company ID 2060). Pico operated a total of four sites within the study area. By 1992, Pico had closed or moved all its operations in the Syracuse area. Also in 1992, Syrtek purchased one of the former Pico operations (Site ID 255) located at 1001 Vine Street in Liverpool, New York. This is the only site owned or operated by Syrtek in the study area which dealt with hazardous or industrial wastes. Pico's initial response to the Joint Request for Information was dated May 26, 1995 (see TAMS' Completeness Review A dated October 10, 1995). NYSDEC and USEPA submitted a request for additional information to Pico on March 10, 1997. Pico provided a supplemental response dated May 15, 1997. Pico also provided "In-Process Control Data" in a submission dated August 14, 1997. Syrtek's initial response to the Joint (NYSDEC/USEPA) Request for Information, dated January 23, 1998, was reviewed for inclusion in this Site Summary Report.

1.1 Location

Pico occupied a total of four sites within a 50-mile limit of Onondaga Lake. Site 255, the Printed Circuit Board Division, was located at 1001 Vine Street in the Village of Liverpool, Onondaga County, New York, and is hereinafter referred to as the "Vine Street Facility." Pico operated this facility from September 1972 until September 1992 at which time the operation was sold in its entirety to Syrtek, Inc., a wholly-owned subsidiary of Goguen Industries, Inc. Syrtek continues to operate out of the Vine Street Facility. Site 256, the Pico Assembly Division, was located off Bridge Street in the Village of Phoenix, Oswego County, New York, and is hereinafter referred to as the "Phoenix Facility." Phoenix is located along the border of Onondaga and Oswego Counties, approximately nine miles north of Onondaga Lake on the northern shore of the Oswego River. This site is outside (downstream) of the watershed of Onondaga Lake. The Pico CATV Division occupied two locations during their

20 years of operations in the Syracuse area. Site 257 was located at 245 Commerce Boulevard in Liverpool, New York. This facility was in operation from 1979 until 1984, at which time the facility was moved in its entirety to 103 Commerce Boulevard in Liverpool, New York (Site ID 258). The 103 Commerce Boulevard facility was in operation from 1984 to 1991, at which time Pico vacated these premises and relocated all operations to Lakeview Terrace, California. The locations of the three facilities in Liverpool are shown in Figure 1.

1.2 Geology

The surficial geology of the Syracuse area was strongly influenced by the most recent glacial advance (Wisconsin age, 12,000 to 14,500 years ago). Syracuse occupies a region that was covered by Lake Iroquois, a large glacial lake situated in front of the ice margin. The broad flat-lying plains situated from Syracuse north to Lake Ontario were formed beneath Lake Iroquois and are characterized by lacustrine fine sand and silt deposits. Additional glacial features which are common to the region are moraines, drumlins, U-shaped valleys and meltwater channels. The last of these features is important in understanding the geology at the Syrtek and Pico sites. Onondaga Lake and all its major tributaries lie within glacial meltwater channels. These features originally formed as a conduit to carry meltwater away from the glacier. They typically transmitted large volumes of water at high velocities. Sediment types characteristically found in meltwater channels are sands and gravels. In the Syracuse region, these relict features form important water bearing and transmitting units which lie in an irregularly branching, net-like pattern throughout the area.

The bedrock geology of the greater Syracuse area includes Lower to Middle Paleozoic age sedimentary rocks predominated by carbonate (dolostone and limestone) and shale, and containing some sandstone, siltstone and evaporites. Bedrock directly beneath the three sites in Liverpool (as well as underneath Onondaga Lake) is the Silurian Vernon Shale (Rickard and Fischer, 1970) which has low permeability, but does possess secondary porosity due to fractures.

1.3 Hydrogeology

According to the Syracuse West US Geological Survey (USGS) Quadrangle, ground surface elevations at the three Liverpool sites range from approximately 410 ft to 420 ft NGVD. Boring logs were not available for review for the four Pico/Syrtek sites at the time this Site Summary Report was written. In the absence of site-specific information, the three sites in Liverpool are expected to be underlain by either glacio-lacustrine sediment and glacial till or outwash sand and gravel deposits associated with glacial meltwater channels. The presence of fill material at these sites is unknown. The generally fine-grained nature of glacio-lacustrine sediment and glacial till suggests a low hydraulic conductivity while the sand and gravel deposits would be expected to possess a higher hydraulic conductivity.

Groundwater level measurements were not provided for the four Pico/Syrtek sites, however, it is expected that the groundwater at the three sites in Liverpool flows either towards Onondaga Lake or tributaries to the Lake (Sawmill Creek and/or the West Branch of Bloody Brook). The site in Phoenix is outside the Onondaga Lake watershed.

1.4 Surface Water Hydrology

Analytical stormwater data were not provided during the period of Pico's operations at the four sites. According to Pico, stormwater at the Vine Street Facility was directed from roof drains through a closed plumbing system to the municipal storm sewer located on Vine Street. Stormwater from the parking areas and driveways was also directed towards the municipal storm sewers located along Vine Street. The storm sewer was operated by the Town of Salina and drained directly into Bloody Brook (Pico Mailing No. 2, p. 0001399). Stormwater from the current Syrtek facility is managed in a similar manner. At its nearest point, the West Branch of Bloody Brook is located approximately 1,600 ft east of the Vine Street Facility. This section of the West Branch of Bloody Brook is approximately 5,000 ft upstream of Onondaga Lake. NYSDEC collected sediment samples from Bloody Brook on

November 13, 1996 (Sample IDs BB-1 to BB-4) and on October 22, 1997 (Sample IDs B101 to B104). These were the NYSDEC sediment sampling locations closest to the Liverpool Pico/Syrtek facilities, and they were all situated at least 2,300 ft upstream. For that reason, these data are not considered further in this Site Summary Report.

The Phoenix Facility (Site ID 256) is located outside the Onondaga Lake watershed. Stormwater from Pico's CATV Division (Site IDs 257 and 258), was most likely directed to the street and into the municipal storm sewer system. According to the USGS Syracuse West Quadrangle, a tributary of Sawmill Creek passes to the north and west of these two sites in Liverpool. At its nearest point, the creek is approximately 1,600 ft west of the 245 Commerce Boulevard site and 3,000 ft west of the 103 Commerce Boulevard site. The West Branch of Bloody Brook is located approximately 2,000 ft east of the 103 Commerce Boulevard site and 3,600 ft east of the 245 Commerce Boulevard site. It could not be determined whether runoff from these two Liverpool sites drained to the Bloody Brook or Sawmill Creek systems. Onondaga Lake is approximately 5,000 ft southwest of the sites in Liverpool.

2.0 SITE HISTORY

2.1 Owners/Operators

Pico operated four facilities within a 50-mile radius of Onondaga Lake. The Printed Circuit Board Division operated at the Vine Street Facility (1001 Vine Street, Liverpool, New York) from September 1972 through 1992. In September 1992, this operation was sold in its entirety to Syrtek, a wholly-owned subsidiary of Goguen Industries, Inc. Syrtek continues to manufacture printed circuit boards at the Vine Street Facility. The Phoenix Facility was located off Bridge Street in Phoenix, New York. This facility operated from 1977 until 1978 at which time the operation was consolidated within the Printed Circuit Board Division at 1001 Vine Street in Liverpool, New York. The CATV Division was located at 245 Commerce Boulevard in Liverpool, New York, and operated out of this location from 1979 until 1984 when the operation was moved in its entirety to 103 Commerce Boulevard in Liverpool, New York. In 1991, the 103 Commerce Boulevard location was vacated and all operations were relocated to the Pico Macom facility in California.

2.2 Site Operations

The Vine Street Facility operation consisted of mechanical fabrication, screen printed graphics, copper electroplating, chemical etching, and metal finishing. Since September 1992, Syrtek has continued the same type of operation at the Vine Street Facility, consisting of the manufacturing of printed circuit boards. A description of the processes used by Syrtek was provided in their response to the Joint Request for Information (Syrtek Mailing No. 1, pp. 000003-000005). Syrtek has implemented a few new processes to their operations, including a dry film process to apply screen printed graphics for copper plating, and the installation of a tin electroplate line which replaced an etching resist operation.

The Phoenix Facility ran a "punch out" operation in which circuits in printed circuit boards that had been manufactured elsewhere were put into a punch press to create a specialized circuit. The CATV Division was engaged in the assembly of CATV trap products (devices used to block premium cable channels). The devices were assembled from components manufactured elsewhere.

2.3 Generation and Disposal of Wastes

From 1972 until 1992, "butyl cellusolve" and lacquer thinner were used at the Vine Street Facility (Site ID 255) on shop cloths supplied by Allied Industrial Laundry of Syracuse. These cloths were used to clean ink residues from the printing machines. Used cloths were stored on-site at the Vine Street Facility in a flammable safety container and were removed by Allied Industrial Laundry on a weekly basis (Pico Mailing No. 1, p. 000007).

In 1988, Pico began to phase out the use of butyl cellusolve and lacquer thinner in their silk screening process and had eliminated its use by 1992. These chemicals were replaced by isopropyl alcohol. During the phase-out period, Pico reported that unused amounts of these materials were believed to have been manifested as a hazardous waste and disposed of according to law (Pico Mailing No. 1, p. 000007).

The chemical etching, copper electroplating, and metal finishing processes of the printed circuit manufacturing at the Vine Street Facility generated hazardous waste. The chemical etching process was a conveyorized spray process for removal of copper metal from the surface of laminated substrates using an ammonium chloride-ammonium hydroxide alkaline etchant chemistry (Pico Mailing No. 1, p. 000007). Fresh etchant was purchased from a chemical supplier and used until the solution became saturated with copper. Spent etchant was classified as a corrosive waste (D002). According to Pico's hazardous waste manifests (Pico Mailing No. 1, pp. 000009-000013), the etchant solution was sent off site to four different facilities for recycling/reclamation. These Transfer, Storage and Disposal Facilities

(TSDFs) included: Hazowaste Corporation, Wampsville, New York; Porter Grove Metal Recovery Company, Bridgeport, Connecticut; Northeast Environmental Services, Inc., Wampsville, New York; and Old Bridge Chemicals, Inc., Old Bridge, New Jersey.

The hazardous waste manifests report that a total of 5,830 gallons of D002 corrosive waste was transported from 1984 to 1986 by Hazowaste Corporation to their TSDF in Wampsville, New York. A total of 24,805 gallons of D002 waste was transported from 1985 to 1988 by Hazmat Environmental Group, Inc. to the Porter Grove Metal Recovery Company in Bridgeport, Connecticut. Also, a total of 2,100 gallons of various wastes (D001, D002, F001, and F005) was transported from 1988 to 1989 by Northeast Environmental Services, Inc. to their TSDF in Wampsville, New York and a total of 9,130 gallons of D002 corrosive waste was transported from 1984 to 1989 by Chemical Lehman Tank Lines to the Old Bridge Chemicals TSDF. Pearcorr Express also transported 715 gallons of D002 corrosive waste to the Old Bridge Chemicals TSDF in 1991, and Freehold Cartage, Inc. transported 28,310 gallons of D002 corrosive waste to the Old Bridge Chemicals TSDF from 1989 to 1992.

The spent etchant waste appears to be listed as a copper chloride solution on the manifests. Documentation for D002 wastes does not exist for the years prior to 1982. Wastes manifested from the Vine Street Facility in 1988 and 1989 included wastes other than the D002 corrosive wastes listed on all other manifests (Pico Mailing No. 1, p. 000011). These wastes consisted of:

- Ignitable wastes (D001) such as methanol and toluene;
- Spent halogenated solvents (F001) such as 1,1,1-trichloro-trifluoroethane and 1,1,1-trichloroethane; and
- Spent non-halogenated solvents (F005) such as methyl ethyl ketone and toluene.

The electroplating and metal finishing processes used at the Vine Street Facility were standard copper and tin lead plating processes for additive metallic creation of electrical

connections and protective coating in the fabrication of printed circuits. The waste streams from these two processes were rinse water effluents containing metals (primarily lead and copper) and organics. In 1976, Pico obtained a discharge permit from the Onondaga County Department of Drainage and Sanitation (OCDDS) for discharge of process wastewater to the Metropolitan (Metro) Syracuse Wastewater Treatment Plant (Pico Mailing No. 1, p. 0000982). The permit provided limits for copper, lead, pH, and several other general parameters. Flow does not appear to be a parameter monitored under the Discharge Permit. Self-monitoring reports indicate that flow was typically in excess of 10,000 gallons per day (gpd) and possibly as high as 20,000 gpd. According to Pico, all wastewater was discharged into the sanitary sewer system (Pico Mailing No. 1, pp. 000014-000015).

The Vine Street Facility also generated solid waste in the form of spent filter media. Only filter media that were no longer capable of reuse after on-site cleaning were disposed of in the dumpsters. Before disposal, the filter media were treated in a bath of 10% sulfuric acid to remove copper and tin lead that would accumulate in the filters during the printed circuit board manufacturing process. The filters would then be dried prior to disposal in the trash cans on the plant floor. The trash cans were emptied into the dumpster. Prior to the startup of the pre-treatment process for wastewater at the Vine Street Facility, the waste sulfuric acid bath liquid would be neutralized with sodium hydroxide and discharged to the sanitary sewer. After the startup of the pre-treatment process [which consisted of cation exchange resin beds, carbon filtration, and pH adjustment (Pico Mailing No. 1, p. 000014)], the acid bath was added to the pretreatment process prior to discharge to the sanitary sewer (Pico Mailing No. 1, p. 000008).

Pico had no documented discharges of process wastewater to nearby surface waters (Bloody Brook or Sawmill Creek). According to Pico's May 1997 response, "all chemical activity and wastewater volumes were restricted to spill control basins, which were located inside the facility, and could not reach the exterior of the building nor the curbside culverts to enter the storm sewer" (Pico Mailing No. 2, p. 0001398).

Syrtek continued to manufacture printed circuit boards at the Vine Street Facility after its purchase of the operation. Process changes implemented by Syrtek included the use of an electroless copper plating technique on drilled production panels from 1992 through 1994. This process generated approximately 1,440 gallons of wastewater per day which was treated in-house prior to discharge to the municipal sewer system. This process was terminated by Syrtek in 1994 when it modified its production practice (Syrtek Mailing No. 1, p. 000004).

Syrtek is currently using a "Direct Metallization Line" process which utilizes a palladium-based chemistry to coat drilled laminate. This process generates approximately the same amount of wastewater which is treated in-house prior to discharge into the municipal sewer system. This process also generates approximately 50 pounds (lbs) per month of waste copper sulfate. This manifested waste copper sulfate is transported off-site by Clean Harbors to their Baltimore, Maryland facility for disposal (Syrtek Mailing No. 1, pp. 000004 and 000012).

Another process change implemented in 1994 included a process referred to as SES-R Etch Resist, which was a chemical application to copper plated panels used as an etching resist. The SES-R process generated approximately 80 gallons per day of rinse water and approximately 160 gallons per month of wastewater from the acid dip tank which was treated in-house prior to disposal into the municipal sewer system. This process was replaced in 1996 with a tin electroplate technology which plated tin to copper plated material by means of a rectifier, cathodes, and anodes in an acid tin bath. This process generates approximately 320 gallons per day of wastewater which is treated in-house prior to disposal into the municipal sewer system. Spent filters from this process were transported off-site by Frank's Vacuum Truck Service, Inc. to Wayne Disposal, Inc. in Romulus, Michigan (Syrtek Mailing No. 1, pp. 000004 and 000011). This process also generates approximately 165 gallons per year of wastewater which is treated on-site and then transported off-site by Clean Harbors to their Bristol, Connecticut facility for disposal (Syrtek Mailing No. 1, pp. 000004 and 000015).

Syrtek listed eleven types of waste generated at the Vine Street Facility (Syrtek Mailing No. 1, pp. 000009-000015). These wastes, along with the average amounts of each waste type generated and the final disposition of each waste stream, are summarized below:

- General industrial waste including fiberglass and copper clad laminate trimmings and dust (approximately 3,100 lbs per month), plastic carrier (approximately 85 lbs per month), polymers (approximately 5 lbs per month), and trash. This waste is transported by a waste hauler to an incinerator or a landfill facility for disposal. From 1994 to the present, these wastes were disposed at the Onondaga County Resource Recovery Agency in North Syracuse, New York. From 1992 to 1994, these wastes were transported by Waste Management, Inc. to the Empire Sanitary Landfill in Pennsylvania.
- Used shop rags contaminated with printing inks and alcohol (approximately 2,000 rags per month). This waste is handled by an industrial laundry service, Staub's of Rochester, New York.
- Filters contaminated with copper and lead - approximately 25 lbs per month and approximately 70 filters per month from copper electroplating and copper cleaning operations, and 5 to 8 filters per month from the "Direct Metallization Line" (palladium based chemistry). This waste is manifested and handled by a waste management company. Information provided by Syrtek indicates that this waste is disposed outside of the basin, most recently at Wayne's Disposal in Romulus, Michigan.
- Spent flux (soldering) - approximately 50 gallons per month. This waste is manifested and transported to a recycling facility outside the basin, most recently to Envotech Management Services in Belleville, Michigan.
- Solder dross (tin-lead solder) - approximately 170 lbs per month. This waste is manifested and transported to a recycling facility outside of the basin, most recently to Hirsch Metals in Wallingford, Connecticut.

- Copper sulfate - approximately 50 lbs per month. This waste is manifested and handled by a waste management company, Clean Harbors in Baltimore, Maryland.
- Spent etch (ammonium hydroxide / ammonium chloride) - approximately 40 to 50 55-gallon drums per month. This waste is transported by a waste hauler to two recycling facilities, Micronutrients, in Indianapolis, Indiana and Old Bridge Chemicals in Old Bridge, New Jersey.
- Scrap metal including printed circuit board edgings, precious metals, aluminum, steel and anodes. These materials are transported by a waste hauler to a recycling facility. Most of this material was sent to facilities outside the basin. Some scrap aluminum was sent to Syracuse Materials Recovery of Syracuse, New York.
- Process baths - These wastewaters are treated on-site, tested for water quality parameters required by OCDDS, and discharged into the municipal sanitary sewer system.
- Tin strip - approximately 165 gallons per year of solder stripper bath. This waste is treated on-site, then handled by a waste management company, Clean Harbors of Bristol, Connecticut.
- Rinse water - approximately 3,360 gpd of ammomium hydroxide/ammonium chloride contaminated rinse water; approximately 1,440 gpd of acid copper bath; approximately 1,000 gallons per month of etchant and copper-saturated wastewater; 480 gpd of lead-contaminated rinse water; approximately 1,440 gpd of wastewater from the Direct Metallization Line (palladium-based chemistry); 480 gpd of film developer wastewater; 720 gpd of dry film stripper rinse water; and 240 gpd of tin strip rinse water. Syrtek pretreats its wastewater in-house prior to discharging to the municipal sewer system. They operate two pretreatment processes. The bulk of their industrial wastewater is treated by a specification exchange process. Wastewaters containing elevated copper concentrations, such as regenerate, are treated through an electrowinning process. Syrtek treats up to 10,000 gpd of industrial wastewater. According to Syrtek, the pretreatment system is a sludgeless system. After

pretreatment, the wastewater is discharged to the sanitary sewer under an OCDDS permit.

The CATV Division (Site IDs 257 and 258) did not use or generate hazardous substances or hazardous wastes. The Phoenix Facility did not use or generate hazardous substances or hazardous wastes. CATV trap products were assembled at the Phoenix Facility from components manufactured elsewhere. After consolidation of the Phoenix Facility operations into the Vine Street Facility operations in 1978, an automated wave soldering machine replaced the hand soldering used at the Phoenix Facility. The wave soldering process only generated recyclable material in the form of solder dross (PbSn). The solder dross was collected in five gallon pails. Approximately once a month, the waste solder dross would be sent to one of several metals recovery facilities. Pico was unable to specify the names of all the potential recovery facilities used during the CATV operations but did list three facilities. Two of these were out-of-state locations. The third, Syracuse Materials Recovery, was located in the City of Syracuse (Pico Mailing No. 1, pp. 000005-000006).

There was no indication of the usage of polychlorinated biphenyls (PCBs) or PCB-containing equipment in the responses from either company. PCBs would only have been available through 1977, the last year that PCBs were manufactured in the United States. It is unlikely that the capacitors used on the printed circuit boards manufactured by Pico contained PCBs given the small size of the finished product.

3.0 POTENTIAL PATHWAYS FOR RELEASE OF HAZARDOUS SUBSTANCES TO THE LAKE SYSTEM

3.1 Soil

Analytical soil data from the Pico sites were not available for review at the time this Site Summary Report was written. According to Pico, the Vine Street Facility was the only operation that stored hazardous substances and generated hazardous wastes. Both Pico and Syrtek stated that soil sampling was not conducted at the Vine Street Facility (Pico Mailing No. 2, p. 0001399 and Syrtek Mailing No. 1, p. 000005). Site maps provided by Pico and Syrtek show the hazardous waste storage area by the loading dock at the rear of the building (Figure 2). Soils at the Vine Street Facility could have been contaminated from spills during product handling in and around the loading dock and chemical storage area.

3.2 Surface Water

The Phoenix site is outside of the Onondaga Lake Basin. The three Liverpool sites are more than 1,500 ft from the nearest tributary of Onondaga Lake. According to the USGS Syracuse West Quadrangle, a tributary of Sawmill Creek is approximately 1,500 ft west of the 245 Commerce Boulevard site in Liverpool. The West Branch of Bloody Brook is approximately 1,600 ft east of the Vine Street Facility and approximately 2,000 ft east of the 105 Commerce Boulevard site in Liverpool. The three Liverpool sites are approximately 5,000 ft north/northeast of Onondaga Lake.

In its supplemental response, Pico stated that stormwater from the Vine Street Facility roof (approximately 15,000 square feet) was collected in the roof drains and directed through the facility in closed plumbing which drained directly to the municipal storm sewer system located on Vine Street (Figure 2). Stormwater from the parking lots and driveways at the site was also directed to the storm sewers on Vine Street (Pico Mailing No. 2, p. 0001399). This

system has been maintained by Syrtek. In 1993, Syrtek obtained a NY State Pollutant Discharge Elimination System (SPDES) general permit (Permit No. GP-93-05) for stormwater discharge. The local storm sewers discharge into the West Branch of Bloody Brook. This discharge represents a potential pathway for the transport of contaminants from the Vine Street Facility to the Onondaga Lake system. Surface water and stormwater sampling was not performed.

3.3 Groundwater

Groundwater data were not available for review by TAMS for the Pico sites. Both Pico and Syrtek stated that groundwater sampling was not conducted at the Vine Street Facility. Groundwater beneath the Vine Street Facility could have been contaminated directly from the runoff and infiltration of spills or by leaks from the loading and unloading of hazardous chemicals and wastes stored at the site. Leaks from the sanitary sewer lines could also release wastewater effluent into the soils beneath the site where it could enter the groundwater.

3.4 Air

According to Pico, three air vents at the Vine Street Facility were permitted to release certain minute quantities of hazardous constituents. Pico was required to report ammonia use and stack emissions to USEPA under SARA Title III Form R Reporting. However, according to Pico, air samples were never collected for testing. Ammonia was a constituent in the etchant solution used in the printed circuit board manufacturing process (Pico Mailing No. 1, pp. 0000990-0001030). If ammonia was released into the atmosphere, it would break down into nitrogen compounds (NOx). The contribution to atmospheric contamination of NOx compounds from Pico would most likely be insignificant. Air emissions do not appear to have been a significant pathway for contamination.

Syrtek makes no mention of this air permit in their initial response. The only mention of air vent emissions was in the SPDES permit which indicated that the hot air leveling machine (used to finish solder on circuit boards) is a possible source of contamination if mixing occurs with stormwater on the roof of the facility (Syrtek Mailing No. 1, p. 000509).

3.5 County Sewer System

Onondaga County completed construction of the Metro Wastewater Treatment Plant, a primary treatment plant on the southeastern shore of Onondaga Lake, in 1960. This wastewater treatment plant, which discharges treated effluent directly to Onondaga Lake, was upgraded to secondary treatment (activated sludge) in 1979 and tertiary treatment (phosphorous removal) in 1981 (UFI, 1994). Wastewater released from the Vine Street Facility during Pico's operational years (1972 to 1992) was discharged to the municipal sewer system which drains to the Metro Wastewater Treatment Plant (Pico Mailing No. 1, p. 000009). Therefore, this discharge represents a potential historic pathway for the transport of contaminants from the Vine Street Facility to the Onondaga Lake system. A discussion of Pico's effluent quality is provided in Section 4.1.

Syrtek continued to discharge treated effluent to the municipal sewer system from 1992, when they purchased the facility, to the present. Syrtek obtained an Onondaga County Industrial Wastewater Discharge Permit (Permit No. 17) from the OCDDS in 1995 for the discharge of treated process wastewater into the county sanitary sewer system (Syrtek Mailing No. 1, p. 000546). Therefore, this discharge represents a potential current pathway for the transport of contaminants from the Vine Street Facility to the lake system. A discussion of Syrtek's effluent quality is provided in Section 4.1.

The daily discharge rate at the Vine Street Facility under Pico's management was typically on the order of 10,000 gpd to 20,000 gpd before October 16, 1990 and between 1,000 gpd and 4,000 gpd after this date. Apparently a major modification to Pico's manufacturing

process was implemented on this date which recirculated the effluent. This resulted in an order-of-magnitude decrease in effluent discharge (Pico Mailing No. 1, p. 0000509). Syrtek's quarterly monitoring reports show flow rates ranging from 510 gpd to 5,460 gpd with the typical flowrate around 1,000 gpd (Syrtek Mailing No. 1, pp. 000353-000386). However, Syrtek listed their process wastewater discharge at 9,000 gpd in their Onondaga County Industrial Waste Questionnaire (Syrtek Mailing No. 1, p. 000540).

4.0 LIKELIHOOD OF RELEASE OF HAZARDOUS SUBSTANCES TO THE LAKE SYSTEM

4.1 Documented Releases

Historical Releases

According to Pico, there were no historic releases of contaminants to the environment during the years that Pico operated in the Syracuse area. According to the documentation, all regulated wastes were properly manifested for off-site disposal or were discharged into the municipal sewer system. Syrtek made a similar statement in their response.

Pico was cited over the years for repeated violations of their OCDDS sewer discharge permit (Pico Mailing No. 1, pp. 0001103-0001115). As a result of these violations, Pico installed a pretreatment unit in 1989 to remove copper, lead, and maintain pH within a certain range prior to discharge into the sanitary sewer system. Daily discharge rates were not always provided for each laboratory report in the Pico response, and contaminant loadings were not calculated by Pico. However, the periodic monitoring forms listed daily discharge rates well in excess of 10,000 gpd for reports prior to October 16, 1990. A major operations change on October 16, 1990 significantly lowered the average daily flow to a few thousand gallons per day (Pico Mailing No. 1, p. 0000509).

Repeated exceedances of copper in the mid to late 1970s were noted in the documents supplied by Pico (Pico Mailing No. 1, p. 0000847). Pico's response (Pico Mailing No. 1, pp. 0000847 and 0000851) indicated a recurring problem of copper and lead exceedances in 1977 for wastewater effluent relative to County Standards. The six wastewater samples collected by the County in 1977 at the Vine Street Facility reported both copper and lead significantly above the county limits for each sampling event. Copper was reported at concentrations ranging from 17.5 parts per million (ppm, or mg/L) to 99 ppm with a County

discharge limit of 3 ppm. Lead was reported at concentrations ranging from 2.52 ppm to 5.40 ppm with a County discharge limit of 0.5 ppm. A May 1, 1978 water sample collected by County officials at the Liverpool Pump Station reported a copper concentration of 564 ppm. County officials estimated the concentration of copper in the Pico effluent for May 1, 1978 at 10% or 100,000 ppm (Pico Mailing No. 1, p. 0000847).

Pico had been issued an Industrial Waste Discharge Permit (Permit No. 17) by the OCDDS on December 1, 1976 (Pico Mailing No. 1, pp. 0000982-0000989). This permit contained a compliance schedule and timetable within which Pico was required to install a pretreatment system for its industrial wastewater effluent. The system was to be fully operational by April 1, 1979 (Pico Mailing No. 1, p. 0000847), however, the pretreatment system was not operational until November 3, 1989. Pico continued to have problems meeting the effluent standards in the mid 1980s (as noted on p. 000812, which reported copper, lead, and pH violations in 1984 and 1985). After completion of the pretreatment system in November 1989, the Vine Street Facility continued to have problems meeting their effluent pretreatment standards, although the magnitude of the exceedances were less than those noted prior to November 1989. In 1990, the copper pretreatment standard was exceeded at least five times and the lead pretreatment standard was exceeded once (Pico Mailing No. 1, p. 0000928). In 1991, the pretreatment standards for pH, lead, and total organics were each exceeded at least once (Pico Mailing No. 1, pp. 0000932-0000934). These exceedances were reported to the OCDDS. Copies of the OCDDS permits were included in Pico's initial response (Pico Mailing No. 1, pp. 0000937-0000989).

Pico provided copies of "In-Process Control Data" in Mailing No. 3 (August 14, 1997) for the wastewater discharge to the municipal sewer. Copper and lead concentration data, along with the associated flow data, were provided for various months from 1990 to 1993. Table 1 provides a summary of the flow and concentration data and an estimate of the contaminant loadings for four of the months during this period, including two months (January and May 1990) prior to initiation of effluent recirculation and two months (September 1991 and June

Table 1

Summary of Wastewater Flows, Concentrations, and Loadings, Vine Street Facility (Site ID 255)

Year	Month	Flow		Total Copper (Cu)				Total Lead (Pb)			
		Daily Avg. (gal)	Monthly Total (gal)	Conc. Range (mg/L)	Avg. Conc. (mg/L)	Avg. Daily Loading (lb/day)	Monthly Total Load (lb)	Conc. Range (mg/L)	Avg. Conc. (mg/L)	Avg. Daily Loading (lb/day)	Monthly Total Load (lb)
Prior to Recirculation											
1990	Jan.	11,716	257,748	0.3-2.4	0.91	0.09	2.00	0.01-0.1	0.07	0.01	0.15
1990	May	9,310	204,810	0.6-2.1	1.07	0.08	1.76	0.03-0.21	0.1	0.008	0.18
Post Recirculation											
1991	Sept.	2,725	59,950	0.1-4.3	2.40	0.05	1.17	0.08-0.18	0.11	0.003	0.06
1992	June	843	18,550	0.3-3.9	2.00	0.013	0.29	0.06-0.58	0.29	0.002	0.04

Notes:
1. Determination of monthly totals based on the number of operating days per month (usually 22).
2. The monthly average concentration based on the available data was used for the operating days in which data were missing.
3. Recirculation of effluent began in October 1990.

Source:
1. Based on "In-Process Control Data" provided by Pico Products (August 14, 1997).

1992) after recirculation was implemented. As shown in the table, discharge flows to the sewer decreased after recirculation was implemented but concentrations of total copper and lead slightly increased. However, loadings decreased due to the significant reduction in flow. The monthly average concentrations for each metal in each of the four months presented were less than the discharge limits. For each month, average daily loadings of both copper and lead were all less than approximately 0.1 lb/day.

Given the numerous exceedances of the effluent standards during Pico's occupancy of the Vine Street Facility, it is likely that during abnormally high exceedances, a portion of the copper and lead enriched effluent from Pico passed through the sewer system and treatment plant and eventually entered Onondaga Lake.

Syrtek provided copies of the quarterly sampling results that were submitted to OCDDS. These reports appear to indicate that Syrtek was, for the most part, in compliance with their discharge permit (Syrtek Mailing No. 1, pp. 000546-000576). The exception appears to be total Kjeldahl nitrogen which was in exceedance (greater than 40 mg/L) for most sampling reports (Syrtek Mailing No. 1, pp. 000425, 000446, 000486, and 000507). Syrtek states in their discharge monitoring reports that this is not a violation of their permit according to OCDDS regulations but will amount to an Industrial Wastewater Surcharge based on the percent contribution to the Metro Wastewater Treatment Plant. In addition, as indicated in Syrtek's compliance data reports, chloroform was detected in the sewer discharge at concentrations ranging from less than 1 μg/L to 660 μg/L (Syrtek Mailing No. 1, p. 000382). The source of the chloroform is not apparent based on the materials provided.

Copies of two Notices of Violations were included in Syrtek's response. The first notice was for an alleged violation of the lead standard (Syrtek Mailing No. 1, pp. 000577-000593). However, Syrtek was able to provide data which verified their compliance during the time of the alleged violation. The OCDDS accepted the data and took no further action on this matter. The second violation was for failure to submit a semi-annual Self-Monitoring Report

for the period January 1 through June 30, 1995 (Syrtek Mailing No. 1, p. 000594). All of the data supplied by Syrtek was not reviewed in detail to determine if other violations existed.

Ongoing Releases

Pico sold the Vine Street Facility in its entirety in 1992. All company operations at 103 Commerce Boulevard were moved to California in late 1991. Syrtek stated in their initial response to the Joint Request for Information that their company has never released any industrial or hazardous waste into the environment (Syrtek Mailing No. 1, p. 000005).

4.2 Threat of Release to the Lake System

4.2.1 Extent of Site Contamination

As noted earlier, information pertaining to soil and groundwater contamination at the four Pico/Syrtek facilities was not available for review at the time this Site Summary Report was written. Based on the information that was provided, it is believed that no such sampling occurred. Thus, a determination of the extent of on-site contamination cannot be made based on the data available, and it is not presently possible to determine whether soil or groundwater contamination are a significant concern at the Pico sites or the Syrtek site.

4.2.2 Migration Potential of Contaminants

The primary contaminants of concern at the Vine Street Facility are copper and lead. Some additional chemicals used in the etchant solution, such as ammonia, and the acid bath solutions, are of lesser concern. Before 1989, Pico did not treat their wastewater effluent to remove copper and lead. Pico stated that pH was adjusted using sodium hydroxide prior to the installation of the pretreatment system in 1989. Numerous violations of the discharge

standard for copper and lead were documented. Syrtek reported an ongoing problem with exceedances of total Kjeldahl nitrogen in their treated effluent.

Because the sewer system and treatment plant discharges to Onondaga Lake, wastewater discharged from the Vine Street Facility may have contributed to contamination of the Onondaga Lake system.

Although permitted, Pico never collected nor was apparently directed to collect air samples from the three air vents that discharge ammonia fumes at the Vine Street Facility. The Pico SARA Title III Permit forms were included in their submission.

5.0 POTENTIAL FOR ADVERSE IMPACTS TO LAKE SYSTEM DUE TO A RELEASE OR THREAT OF A RELEASE

The information provided by Pico and Syrtek did not indicate that the four sites have been a source of contamination, with the exception of industrial wastewater discharges from the Vine Street Facility to the municipal sanitary sewer. Therefore, the potential impact of the migration of contaminants (if any) from these sites to the Onondaga Lake system is unknown.

5.1 Hazardous Substance Characteristics

As discussed in Section 4.2, the primary contaminants of concern from the Vine Street Facility are copper and lead. The pH and total Kjeldahl nitrogen of the wastewater effluent were also concerns.

There is a potential for adverse impacts to the Onondaga Lake system as a result of historical transport of copper and lead through the Onondaga County sewer system. Factors which govern the extent of this potential impact include the quantity of contaminant released, contaminant mobility, toxicity, and persistence, as well as the tendency for the contaminant to bioaccumulate. Although the concentrations of copper and lead at the Vine Street Facility may have been high as it entered the sanitary sewer system, the concentration of the effluent as it reached the Metro Wastewater Treatment Plant was likely orders-of-magnitude less due to dilution of the Pico effluent as it mixed with the overall plant influent.

The pH of the industrial effluent was a general parameter of concern for all Metro Wastewater Treatment Plant industrial users. Although the Vine Street Facility had occasional problems in meeting the pH requirements (pH range of 5.5 to 9.5), the overall effect of high pH effluent would most likely be undetectable by the time the effluent reached the Metro Wastewater Treatment Plant. When this effluent mixed with other waste streams,

the overall pH would change due to dilution and would likely be within the acceptable range. The total Kjeldahl nitrogen exceedances from Syrtek's operations were likely treated by the Metro Wastewater Treatment Plant prior to discharging to the lake.

Mobility

Lead mobility in the environment is governed by a number of environmental conditions such as pH, oxidation state, and water hardness. Elemental lead (metallic lead) may also have been present as a result of the processes which occurred on-site. However, natural weathering is ultimately expected to oxidize any elemental lead. Lead mobility in oxidized and elemental form is expected to be controlled by lead-bearing soil particle movement. As a result, site lead, if present, will be associated with soil particles and lead mobility will, in part, be governed by the same processes responsible for soil movement, i.e., surface water flow, particle size and depositional environment.

Once deposited on the lake bottom, there exists the potential for reduction and remobilization of lead from the reducing sediments to the overlying waters. This condition may be enhanced by the near-anoxic conditions which occur in the Lake hypolimnion during summer stratification. However, the hardness of Onondaga Lake water, the presence of oncolites in the sediments, and recent improvements in water quality should limit this process.

The mobility of copper in freshwater is strongly dependant on pH, Eh, and the occurrence of potential surfaces such as organic matter and other clay mineral species. Copper has a strong affinity for the hydrous iron and manganese oxides, clays, carbonate minerals, and organic matter. Sorption to these materials results in the relative enrichment of the bed sediments and the reduction of copper in the dissolved phase. The sorption of copper to other materials effectively results in the removal of copper from the water column and

greatly inhibits copper's mobility in the environment. In polluted waters, studies have indicated that the controlling factor is sorption on to organic minerals (USEPA, 1979).

Toxicity

Lead may adversely affect survival, growth, reproduction, development, and metabolism of most species under controlled conditions, but its effects are substantially modified by physical, chemical, and biological variables (Eisler, 1988). In general, organo-lead compounds are more toxic than inorganic lead compounds, food chain biomagnification of lead is negligible, and immature organisms are most susceptible to toxicity.

Lead is classified as B2, a probable human carcinogen, based on rat and mouse studies with dietary and subcutaneous exposure to several soluble lead salts (USEPA, 1995). In humans, ingestion of lead leads to symptoms such as loss of appetite, anemia, malaise, insomnia, headaches, irritability, muscle and joint pains, tremors, hallucination and distorted perceptions, muscle weakness, gastritis, and liver changes. Ingestion also produces cardiac lesions and abnormalities in electrocardiograms. There is evidence of teratogenicity in fetuses when pregnant women are exposed to lead and exposed fetuses may exhibit neurobehavioral dysfunctions. Studies for mutagenicity have determined that lead causes structural chromosomal aberrations.

Lead is also toxic to all phyla of aquatic biota, but its toxic action is modified by species and physiological state. Wong et al. (1978) reported that only soluble waterborne lead is toxic to aquatic biota, and that free cationic forms are more toxic than complexed forms.

Copper is a common component of many algicides, insecticides, molluscides, and plant fungicides. It is toxic to aquatic life at high concentrations, especially the divalent copper ion and its hydroxy complexes (USEPA, 1979). In humans, copper is an essential nutrient for health. Copper is readily absorbed into the bloodstream through the stomach and small

intestine. After copper requirements are met, there are several mechanisms that prevent copper overload. Excess copper is excreted from the body. However, high concentrations of ingested copper can cause stomach cramps, nausea, and induce vomiting and/or diarrhea. Copper is not considered a carcinogen or possible carcinogen.

Persistence

Both copper and lead are very persistent in both water and sediment. Since both copper and lead are elements, they cannot be broken down at all and their concentrations in environmental media are governed solely by dilution mechanisms. In the environment, both copper and lead can be transformed from inorganic to organic forms, affecting their respective toxicity, but ultimately only dilution or removal affect the presence of these two elements.

Bioaccumulation

Lead tends to bioaccumulate/bioconcentrate within living organisms, however, there is no convincing evidence that it is transferred through food chains (Wong et al., 1978; USEPA, 1979; and Settle and Patterson, 1980). In surface water, lead concentrations are usually highest in benthic organisms and algae and lowest in upper trophic level predators (e.g., carnivorous fish).

As an essential nutrient, copper is strongly bioaccumulated by all plants and animals. However, data do not indicate that copper can bioaccumulate in higher organisms such as fish (USEPA, 1979).

5.2 Quantity of Substance

The quantity of copper and lead from Pico and/or Syrtek discharges entering the waters of Onondaga Lake are difficult to quantify as the discharge was not direct. It can be assumed that much of the copper and lead that entered the sewage treatment plant was precipitated out of the wastewater and was disposed as sludge. Only a fraction of these contaminants could be expected to pass through the system and actually enter the waters of Onondaga Lake.

5.3 Levels of Contaminants

It is difficult to quantify the mass of contaminants that were in the wastewater effluent from the Vine Street Facility since flow (discharge) rates are needed with the actual concentrations for a particular time period. Many of the analytical results did not list the flow rate for the analysis, and it was noted that the flow rate decreased by an order-of-magnitude in October 1990. Furthermore, OCDDS did not use mass load calculations in setting effluent standards for Pico as per their permit. Pico's permit was based on a maximum concentration and a four-day average concentration, rather than a daily mass loading.

As a reference, the mass loading was calculated for copper and lead using the effluent standards. The maximum allowable mass load for copper (5.0 mg/L daily allowable limit) was approximately 0.7 lb/day assuming an average flow of 16,000 gpd and 0.1 lb/day assuming an average flow of 2,000 gpd. In addition, a random exceedance was selected to calculate the mass load. An effluent sample collected on February 26, 1990, reported a copper concentration of 36.1 mg/L (Pico Mailing No. 1, p. 0000928). This concentration would have produced a mass load of 4.8 lb/day of copper in the effluent for this particular day, at a flow rate of 16,000 gpd. Prior to the installation of the pretreatment system, a copper concentration of 100,000 ppm was estimated in the Pico effluent by OCDDS in 1978

(see Section 4.1). At a flow of 16,000 gpd, the mass loading of copper would have been approximately 13,300 lb/day.

For lead, which had a daily allowable limit of 1.0 mg/L, estimates of the mass load were 0.13 lb/day assuming an average flow of 16,000 gpd and 0.02 lb/day assuming an average daily flow of 2,000 gpd. Again, a random exceedance was selected to calculate the mass load. An effluent sample collected on November 27, 1989 reported a lead concentration of 2.6 mg/L (Pico Mailing No. 1, p. 0000919). Assuming a flow of 16,000 gpd, this concentration would produce a mass load of 0.35 lb/day of lead in the effluent for this particular day.

As shown in Table 1 in Section 4.1, average daily loadings of both copper and lead in January 1990, May 1990, September 1991, and June 1992 were all less than approximately 0.1 lb/day. It should be noted that these loadings represent the estimated mass of copper and lead discharged to the sewer system and not to the lake system.

5.4 Impacts on Special Status Areas

The three Pico sites (and one Syrtek site) in Liverpool are not situated in an area where direct impact to protected habitats or streams is likely to have occurred. As stated earlier, it could not be determined whether runoff from two of the three Pico sites (Site IDs 257 and 258) drain to the Sawmill Creek or Bloody Brook systems. In its supplemental response, Pico stated that stormwater runoff from the Vine Street Facility was directed towards storm sewers along Vine Street that discharge to the West Branch of Bloody Brook (Pico Mailing No. 2, p. 0001398). Sawmill Creek, near the Liverpool sites, from its mouth at Onondaga Lake to Morgan Road (designated "Euclid Road" in the NY Code) is a Class B waterbody, and is thus considered a "protected stream" in New York State. The West Branch of Bloody Brook near the Liverpool sites is a Class C waterbody and is thus not a "protected stream." Bloody Brook is a Class B stream downstream near the mouth. Based on the information provided, it does not appear that these surface waters were impacted by operations at the

Pico/Syrtek sites. However, data are not currently available for review to confirm this assumption.

The nearest NY State freshwater wetland (designated SYW 3), which parallels the NY State Thruway, is approximately 800 ft west of Site ID 257, 1,800 ft west of Site ID 258 and approximately 2,000 ft west of the Vine Street Facility. According to the Syracuse West National Wetlands Inventory (NWI) Map (USDOI, 1978), this state wetland is also a federal wetland classified as a Palustrine, Forested Wetland (PFO). Also, the near-shore open water portion of Onondaga Lake at the mouth of Bloody Brook is classified as a Lacustrine, Littoral, Open Water Wetland (L2OWH). As of August 1996, there were no New York State "Natural Heritage Sensitive Elements" known in the immediate vicinity of these sites (within one mile).

6.0 SUMMARY OF CONCERNS

The primary concern for the Pico sites in Liverpool is the potential for historic copper and lead contamination to have reached Onondaga Lake through discharges into the sanitary sewer system. Prior to 1989, Pico did not have a pretreatment system in place to reduce copper and lead concentrations. Throughout the 1970s and 1980s, Pico received numerous Notices of Violations of their effluent standards from the OCDDS. Even after the pretreatment system was operational, Pico's effluent continued to exceed the standards in 1990, 1991, and 1992. Syrtek continues to generate similar waste effluent that is discharged to the sanitary sewer system. However, the more recent Syrtek quarterly discharge reports to the OCDDS indicate that the pretreatment system was effective in reducing the copper and lead content of the effluent to within the permitted limits. Also of concern is the potential for industrial wastewater from the Vine Street Facility to leak from existing sewer lines into the surrounding soils and groundwater.

Hazardous wastes were stored in 55-gallon drums at the Vine Street Facility prior to shipment to a TSDF. This facility was in operation for twenty years, from 1972 to 1992. Pico records indicate that several thousand gallons of waste liquid were manifested from the Vine Street Facility each year and the records appear to indicate that the volume increased in the late 1980s. In their supplemental response, Pico provided a site plan (see Figure 2) which shows the chemical waste storage area inside the building, adjacent to the loading dock. Although there were no reported spills, it is possible that hazardous liquids were spilled in small quantities over the years and that these wastes accumulated in the soils beneath the storage area and/or loading dock at the Vine Street Facility. There were no soil or groundwater sampling results provided by either Pico or Syrtek for the four facilities. Consequently, the condition of the soils and groundwater beneath the drum storage area and loading dock is uncertain.

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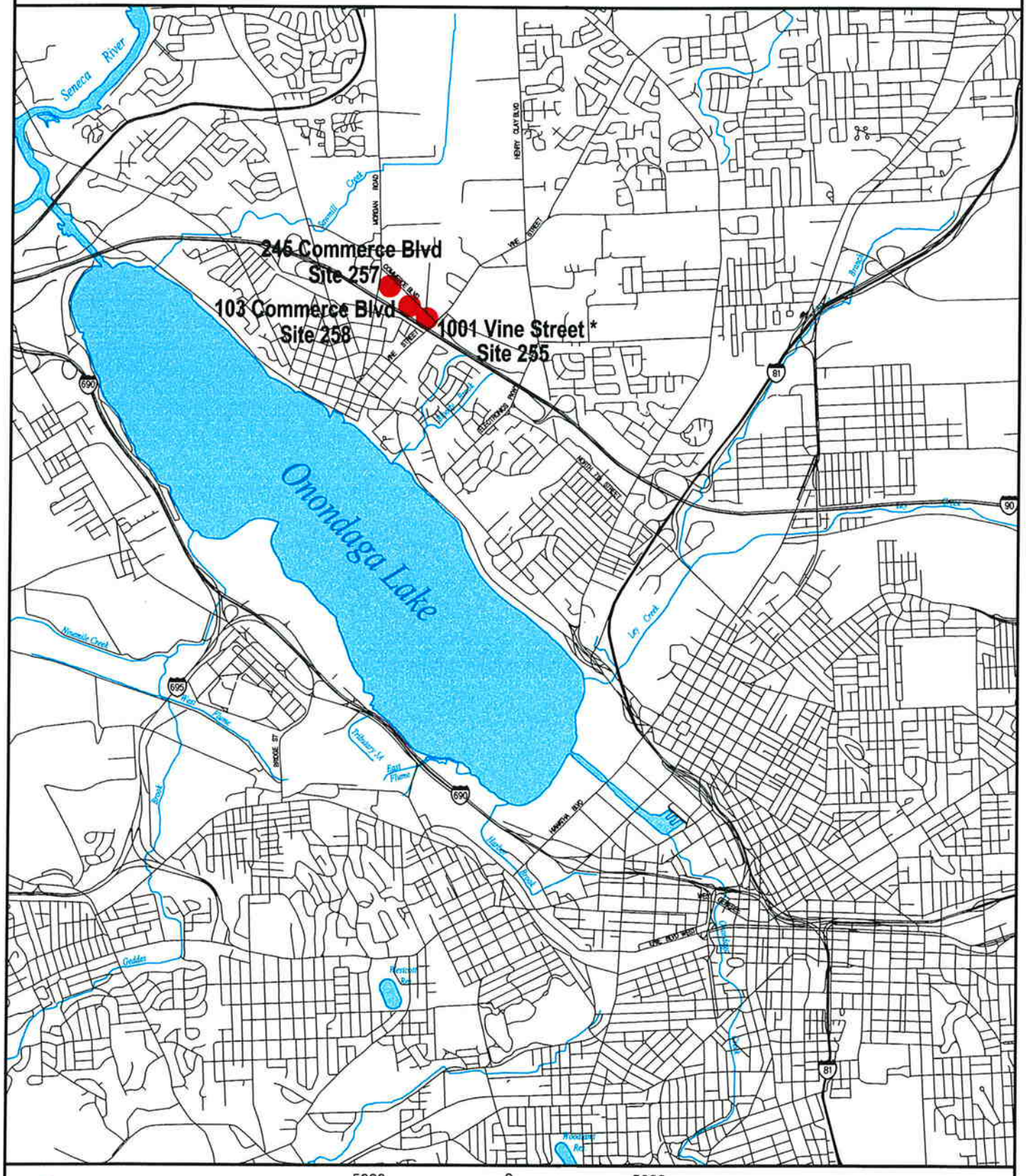

* Site 255 currently owned/operated by Syrtek

Figure 1

FIGURE 2
VINE STREET FACILITY

Source: Composite of site plans submitted by Pico Products, Inc. and Syrtek, Inc.